1) Twenty-three people were surveyed to find the number of minutes they exercise each week.
   Find the mean, median, and mode of the data.
   If any of these measure cannot be found, briefly explain why.

108	139	120	123	120	150	124	111	101	132	123	131
139	119	118	131	157	119	116	117	127	114	127	

mean: $\bar{x} = \dfrac{2866}{23} \approx 124.6$ $Q_2 = 123$ mode: none — too many values repeat the same # of times

2) The breeds of several dogs and the number of each registered is given.
   Find the mean, median, and mode of the data.
   If any of these measure cannot be found, briefly explain why.

Breed	Labrador Retriever	Yorkshire Terrier	German Shepherd	Golden Retriever	Beagle	Dachshund	Boxer
Number registered (in thousands)	124	48	44	43	39	36	35

mean + median cannot be found from nominal/qualitative data.

mode: Lab

3) Weekly salaries (in dollars) for a sample of registered nurses are listed.

   774 446 1019 795 908 667 444 960   444 − 446 − 667 − 774 | 795 − 908 − 960 − 1019

   (a) Find the mean, the median, and the mode of the salaries. Which best describes a typical salary?

mean: $\bar{x} = \dfrac{6013}{8} \approx \$751.60$

median: $\dfrac{774 + 795}{2} = \dfrac{1569}{2} = \$784.5$

mode: none — no weekly salary repeats

Sec 2.3

1 of 3

4) The cost of five homes in a certain area is given.

$164,000 $176,000 $192,000 $185,000 $1,242,000
                                                    OUTLIER!

Which measure of central tendency should be used and why?

The mean because the last house's cost is an outlier. $Q = 176,000$ $Q_3 = 192,000$

$IQR = 192 - 176 = 16,060$
$$\times 1.5$$
$$24,000$$

$Q_1 - 24,000 = 152,000$

$Q_3 + 24,000 = 216,000$

Range of Norm Vals: $(152K, 216K)$

5) **Grades** A student receives the following grades, with an A worth 4 points, a B worth 3 points, a C worth 2 points, and a D worth 1 point. What is the student's mean grade point score?

B in 2 three-credit classes   D in 1 two-credit class
A in 1 four-credit class   C in 1 three-credit class

Grade	Points (x)	Credit Hours (w)	x·w
B	3	3	9
B	3	3	9
A	4	4	16
D	1	2	2
C	2	3	6
		$\sum w = 15$	$\sum xw = 42$

$$\sum \frac{xw}{\sum w} = \frac{42}{15} = 2.8$$

The students gpa is a 2.8

6) You collect a random sample of the number of children per household in a region. The results are shown at below. Complete the table and find the sample mean of the data set.

| Number of children per household, x	Number of households, f	xf
0	10	0
1	19	19
2	7	14
3	7	21
4	2	8
5	1	5
6	4	24
	$\sum f = 50$	$\sum xf = 91$

$$\bar{x} = \frac{\sum xf}{\sum f} = \frac{91}{50} = 1.82$$

The mean # of kids per household is 1.82 children.

Determine whether the approximate shape of the distribution in the histograms are symmetric, uniform, skewed right, or skewed left,. Then determine which is greater, the mean or the median, or are the two measures relatively the same.
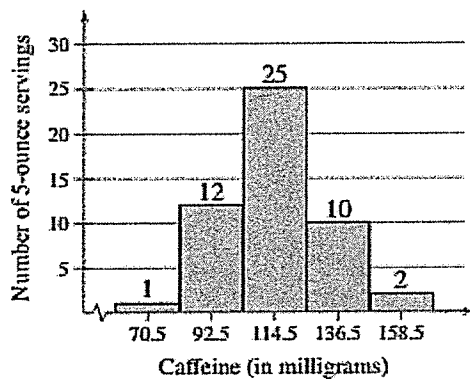
7)
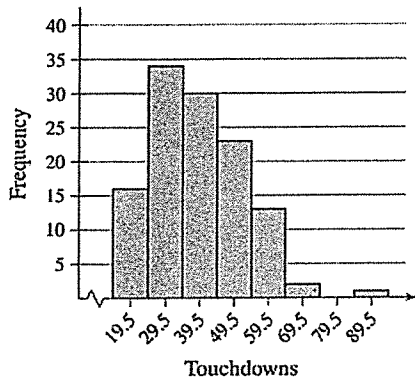
Shape of the distribution:

Skewed right

Compare the mean and the median:

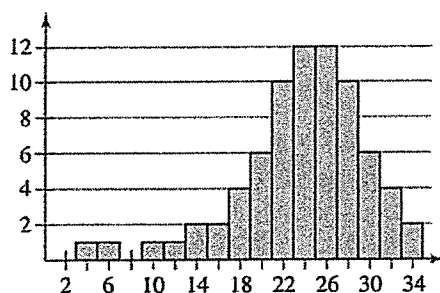mean > median

↑
dragged artificially high

8)

Shape of the distribution:

Symmetric

Compare the mean and the median:

mean ≈ median

9)

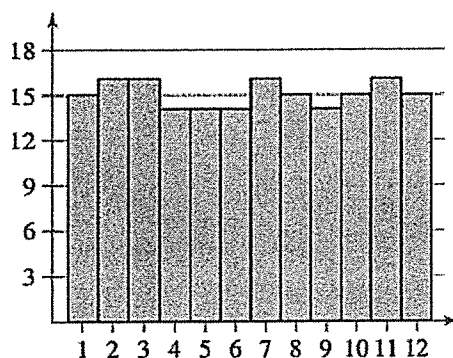Shape of the distribution:

skewed left

Compare the mean and the median:

mean < median

↑
dragged artificially low

10)

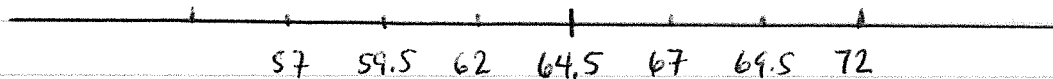Shape of the distribution:

uniform or rectangular
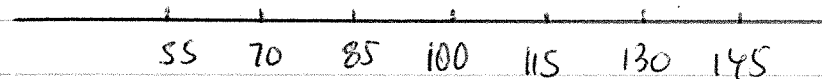
Compare the mean and the median:

mean ≈ median

Sec 2.3
3 of 3

Section 2.4 Test Review

1a)

```
|----+----+----+----+----+----+----|
    57  59.5  62  64.5  67  69.5  72
```

b) $34 + 34 + 13.5 = 81.5$

c) $34 + 13.5 = 47.5$

d) $34 + 34 + 13.5 + 2.35 = 83.85$

e) $34 + 34 = 68$

2.a)

```
|----+----+----+----+----+----+----|
    55  70  85  100  115  130  145
```

b) $34 + 13.5 + 2.35 + .15 = 50\%$

c) $70 - 130$

d) $50 + 34 + 13.5 = 97.5\%$

e) 130

3a) Data is skewed, so use Chebychev's Theorem

b)

```
|----+----+----+----+----+----+----|
    65  70  75  80  85  90  95
```
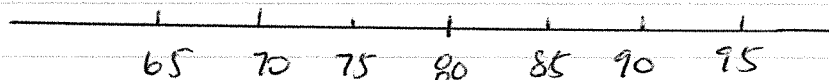
c) At least 75% of scores are between 70 + 90

d) At least 88.9% of scores are between 65 + 95.

4. range: $14 - 2 = 12$ wins $\sigma^2 = 8.125$ wins

mean: $\mu = \dfrac{258}{32} = 8$ wins $\sigma = 2.85$ wins

5 a) sample mean $(\bar{x})$ b) population variance (σ^2) c) sample std. dev (s)

d) sample deviation $(x - \bar{x})$ e) sample variance (s^2)

f) population deviation $(x - \mu)$ g) sample size (n) Sec 2.4

h) population mean (μ) i) population size (N) j) pop. std.   1 of 3
dev (σ)

1)   The data set represents the mean price of a movie ticket (in U.S. dollars) for a sample of 12 U.S. cities. Find the range of the data set.

7.82 7.38 6.42 6.76 6.34 7.44 6.15 5.46 7.92 6.58 8.26 7.17

Range 8.26 - 5.46 = $\boxed{2.8}$

2)   The age of each Supreme Court justice as of March 19, 2007 is listed. Find the population mean and standard deviation of the data.

Ages	$X - \mu$	$(X - \mu)^2$
52	-14.9	220.01
86	19.1	364.81
71	4.1	16.81
70	3.1	9.61
67	.1	.01
58	-8.9	79.21
74	7.1	50.41
68	1.1	1.21
56	-10.9	118.81

$\Sigma_i x = 602$

$N = 9$

$\mu = \dfrac{602}{9} \approx 66.9$

$\Sigma(x-\mu)^2 = 862.89$

$\sigma^2 = \dfrac{\Sigma(x-\mu)^2}{N} = \dfrac{862.89}{9}$

$\sigma^2 = 95.8767$

$\sigma \approx 9.79 \text{ yrs}$

3) Which data set has the larger standard deviation? Explain.

(A)

$N = 20$

$\mu = 40$

(B)

$N = 20$

$\mu = 40$
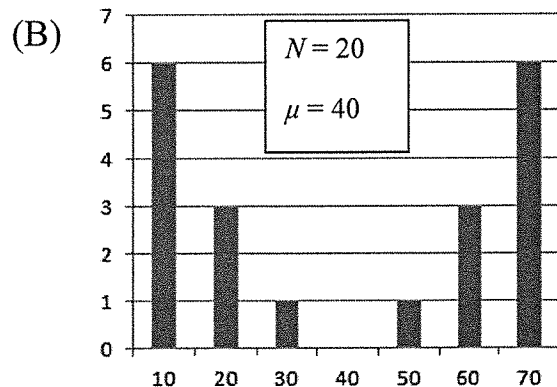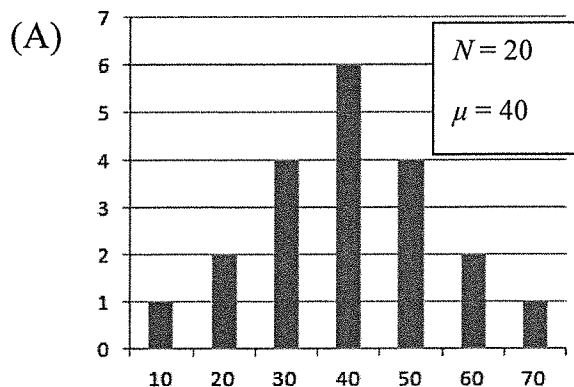
B - More data is in the outer bars, away from the mean

Sec 2.4
2 of 3

4) Dormitory room prices (in dollars for one school year) for a sample of 4-year universities are listed. Find the sample mean and the sample standard deviation of the data.

Dormitory X Room Price	$x - \bar{x}$	$(x - \bar{x})^2$
2445	-8.4	70.56
2940	486.6	236779.56
2399	-54.4	2959.6
1960	-493.4	243443.56
2421	-32.4	1049.76
2940	486.6	236779.56
2657	203.6	41452.96
2153	-300.4	90240.16
2430	-23.4	547.56
2278	-175.4	30765.16
1947	-506.4	256440.96
2383	-70.4	4956.16
2710	256.6	65843.56
2761	307.6	94617.76
2377	-76.4	5836.96

$\sum x = 36,801$

$\sum A = 1,311,783.6$

$n = 15$ $\bar{x} = \frac{3680l}{15} = 2453.4$ 2453.40

$s^2 = \frac{\sum (x - \bar{x})^2}{n-1} = \frac{1311783.6}{15-1}$

$s^2 = \frac{1311783.6}{14} \approx 93698.8$

$\sqrt{\quad}$ $\sqrt{\quad}$
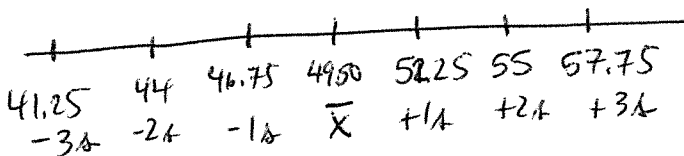
$s \approx 306.1$

$\$306.10$

5) The mean rate for satellite television from a sample of households was $49.50 per month, with a standard deviation of $2.75 per month. Estimate the percent of satellite television rates between $46.75 and $52.25. (Assume that the data set has a bell-shaped distribution.)

41.25   44   46.75   49.50   52.25   55   57.75
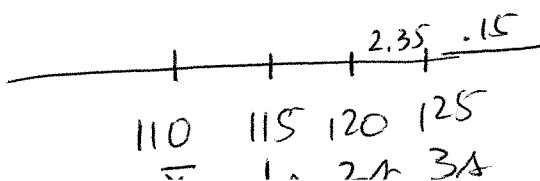-3A   -2A   -1A $\bar{x}$ +1A   +2A   +3A

$34 + 34 = 68\%$

6) The average IQ of students in a particular calculus class is 110, with a standard deviation of 5. The distribution is roughly bell-shaped. Use the Empirical Rule to find the percentage of students with an IQ above 120.

a) 13.5%   b) 11.15%   c) 2.5%   d) 15.85%

2.35   .15

110   115   120   125
       1A   2A   3A

$2.35 + .15 = 2.5$

Sec 2.4

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Statistics 2.5 Review

Measures of Position
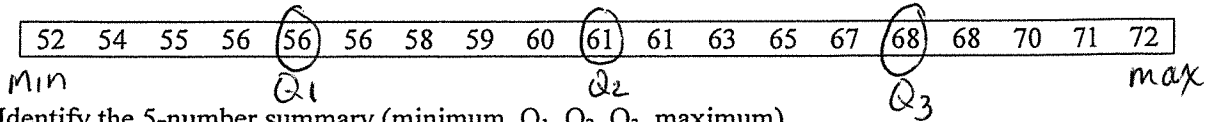
Name:

Hour: Date: *Key*

1) The heights (in inches) of students in a statistics class are given below.
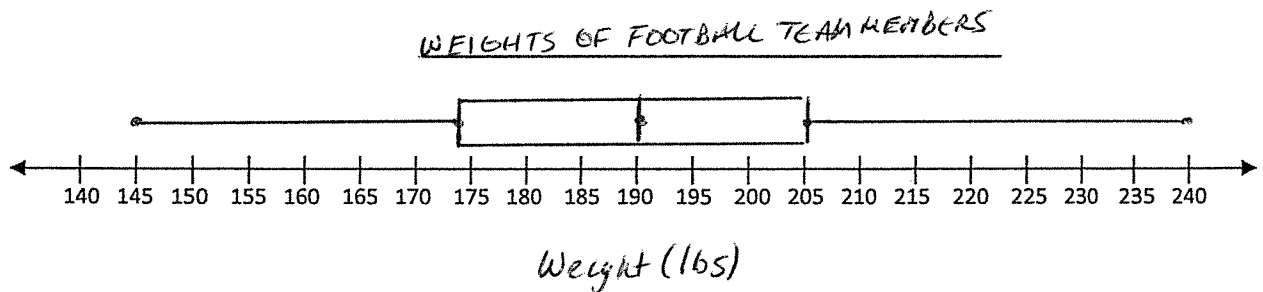
52	54	55	56	(56)	56	58	59	60	(61)	61	63	65	67	(68)	68	70	71	72

Min Q_1 Q_2 Q_3 *max*

a) Identify the 5-number summary (minimum, Q_1, Q_2, Q_3, maximum)

b) Find the interquartile range (IQR) $= 68 - 61 = 7$

c) Make a box-and-whisker plot of the data

HEIGHTS OF STATS STUDENTS

52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72
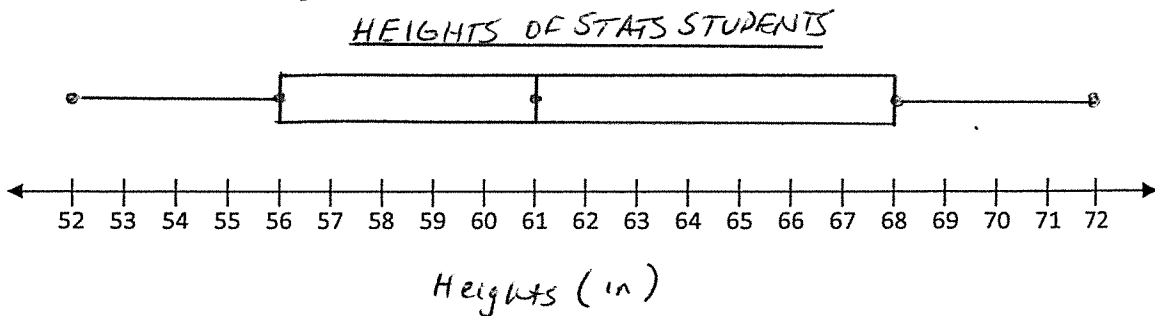
Heights (in)

2) The weights (in pounds) of the defensive players on a high school football team are given below.

5	1	14	14	13	17	2	19	4	8	15	7	10	3	16	18	9	6	12
173	145	205	192	197	227	156	240	172	185	208	185	190	167	212	228	190	184	195

Q_1 *min* Q_3 *max* Q_2
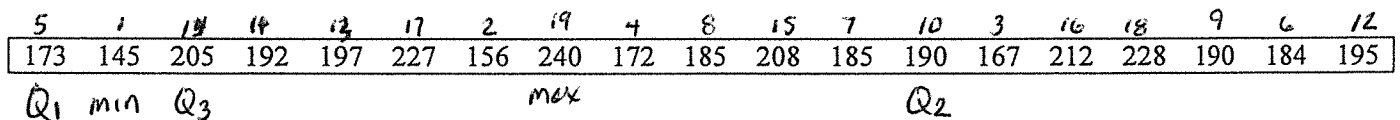
a) Identify the 5-number summary (minimum, Q_1, Q_2, Q_3, maximum)

b) Find the interquartile range (IQR) $208 - 173 = 35$

c) Make a box-and-whisker plot of the data

WEIGHTS OF FOOTBALL TEAM MEMBERS

140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240

Weight (lbs)

3) Using the box-and-whisker plot at the right,

a) Identify the value for the minimum 2

b) Identify the value for the first quartile, Q_1 8

c) Identify the value for the second quartile, Q_2 16

d) Identify the value for the third quartile, Q_3 32

e) Identify the value for the maximum ~~40~~ 36

f) Find the interquartile range (IQR) $32 - 8 = 24$

g) Approximately what percent of the data are between 8 and 32? 50%

h) Approximately what percent of the data are between 16 and 32? 25%

25%

0 4 8 12 16 20 24 28 32 36 40
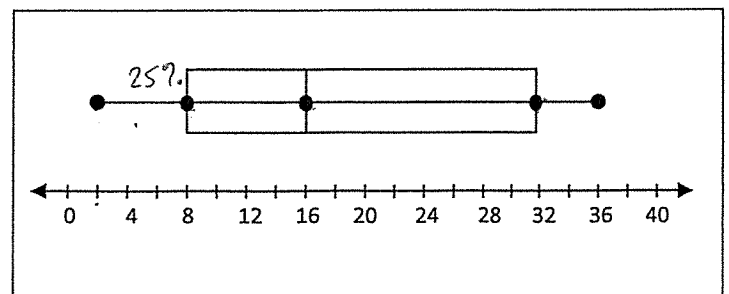
4) A student's test grade of 68 represents the 77th percentile of the grades. What percent of students scored <u>higher</u> than 68?

$1 - .77 = .23$ 23% scored higher than 68.

5) In 2007, there were 768 "oldies" radio stations in the United States. If one station finds that 84 stations have a larger daily audience than it has, what percentile does this station come closest to in the daily audience rankings?

above: $\frac{84}{768}$ $\frac{768-84}{768} \approx .89$ 89th %ile

6) A student's SAT score of 1230 is in the 8th decile for the students who took the SAT in 2017. What is the percentile for this score? 8×10

80th percentile

7) The 50th percentile is equivalent to which quartile? Q_2

$50/25 = 2$

8) The weight of 10 high school football players have a bell-shaped distribution, with a mean of 186 pounds and a standard deviation of 18 pounds. Find the z-scores for each of the following weights of randomly selected football players. Determine which, if any, of these are unusual (or very unusual).

a) 213 pounds

b) 141 pounds

c) 178 pounds

d) 249 pounds

a) $z = \frac{213-186}{18} = \frac{27}{18} = 1.5$

c) $z = \frac{178-186}{18} = \frac{-8}{18} = -.44$

b) $z = \frac{141-186}{18} = \frac{-45}{18} = -2.5$ unusual

d) $z = \frac{249-186}{18} = \frac{63}{18} = 3.5$ very unusual

9) The mean price of new homes from a sample of houses is $155,000 with a standard deviation of $15,000. The data set has a bell-shaped distribution. Find the z-scores for the following house prices, and use the z-scores to determine which, if any, of the following house prices is unusual (or very unusual).

a) $200,000

b) $55,000

c) $175,000

d) $122,000

a) $z = \frac{200000-155000}{15000} = \frac{45000}{15000} = 3$ Very unusual

b) $z = \frac{55000-155000}{15000} = \frac{-100000}{15000} = -6.67$ very unusual

c) $z = \frac{175000-155000}{15000} = \frac{20000}{15000} = 1.33$

d) $z = \frac{122000-155000}{15000}$
$z = \frac{-33000}{15000} = -2.20$ unusual

10) What does a z-score of 0 indicate?
Score = mean

11) What does a negative z-score indicate?
Score < mean

12) What does a positive z-score indicate?
score > mean

13) Between which standard deviations does a z-score of 1.5 occur?
Between $1\sigma + 2\sigma$

14) Using a standard bell curve, what percent of scores lie between a z-score of -1.0 and 1.0?   Sec 2.5

$34 + 34 = 68\%$ $\pm 1\sigma$ 292